VizBBA
Visualization of Bike Sharing Rides in Bay Area

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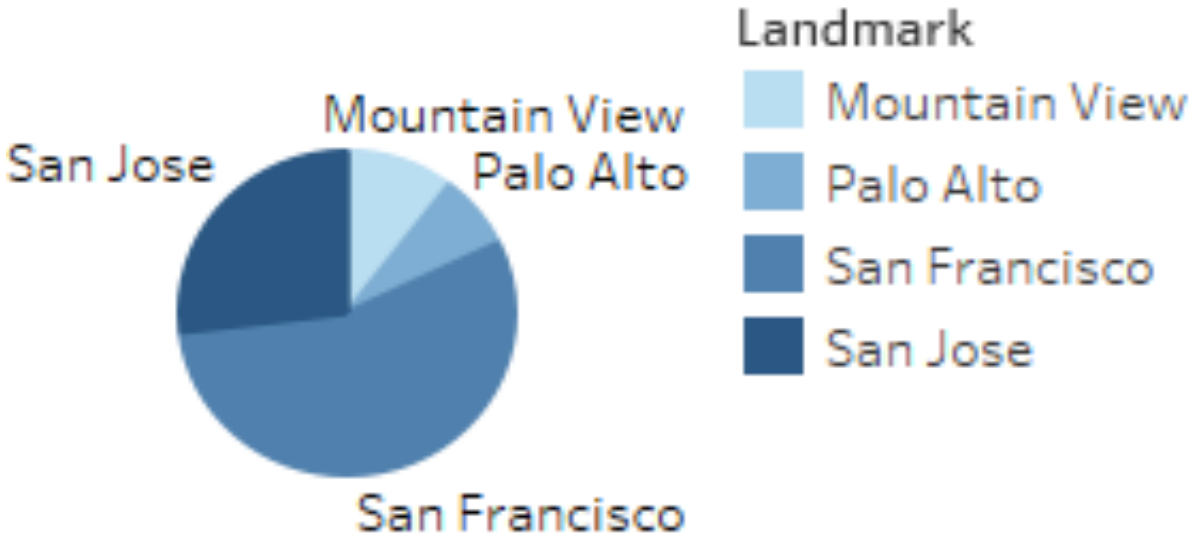
What is Bay Area Bike Share?

A completely automated system that allows the users to rent bicycles for short journeys between stations throughout the city.

Types of users:

- Annual members
- Short term (1 to 3 days)

There are 69 stations across 4 cities in the Bike Share system, with an average of 17 docks per station.



MOTIVATION

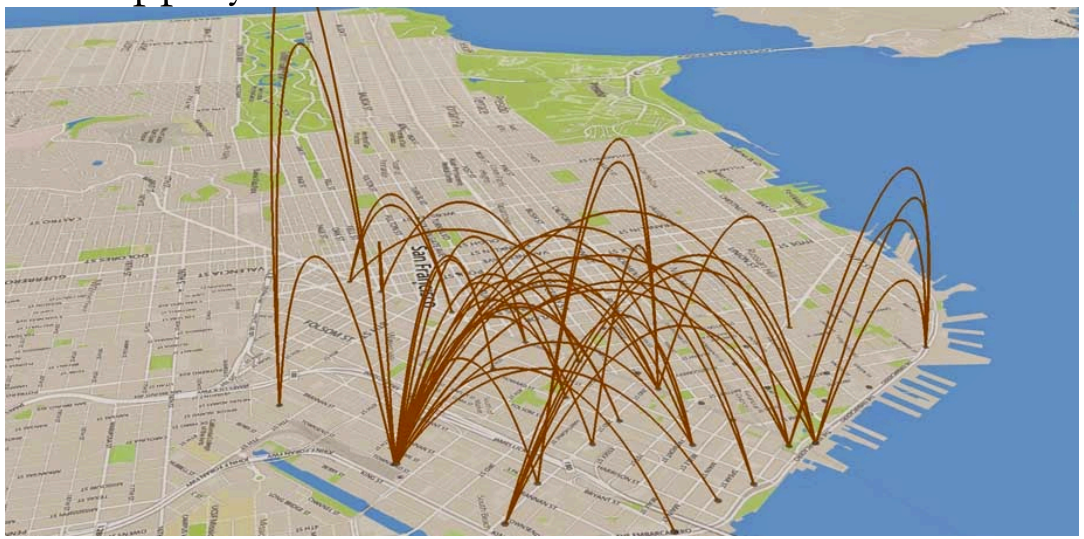
- Bay Area Bike Share is expanding tenfold from 700 to 7000 bikes starting in Spring 2017.
- The bike share program is exploring different ways to select new stations.
- Outreach processes followed to select bike share locations include :
    1. Online crowdsourcing : 5,000 submissions received from users across Bat Area.
    2. Stakeholder meetings: 115.
    3. Public Workshops: 19 workshops conducted where neighbors sit around maps and discuss which station locations work best for their community.

This urges for a need to identify neighborhoods which require more bike stations using effective visualization techniques.

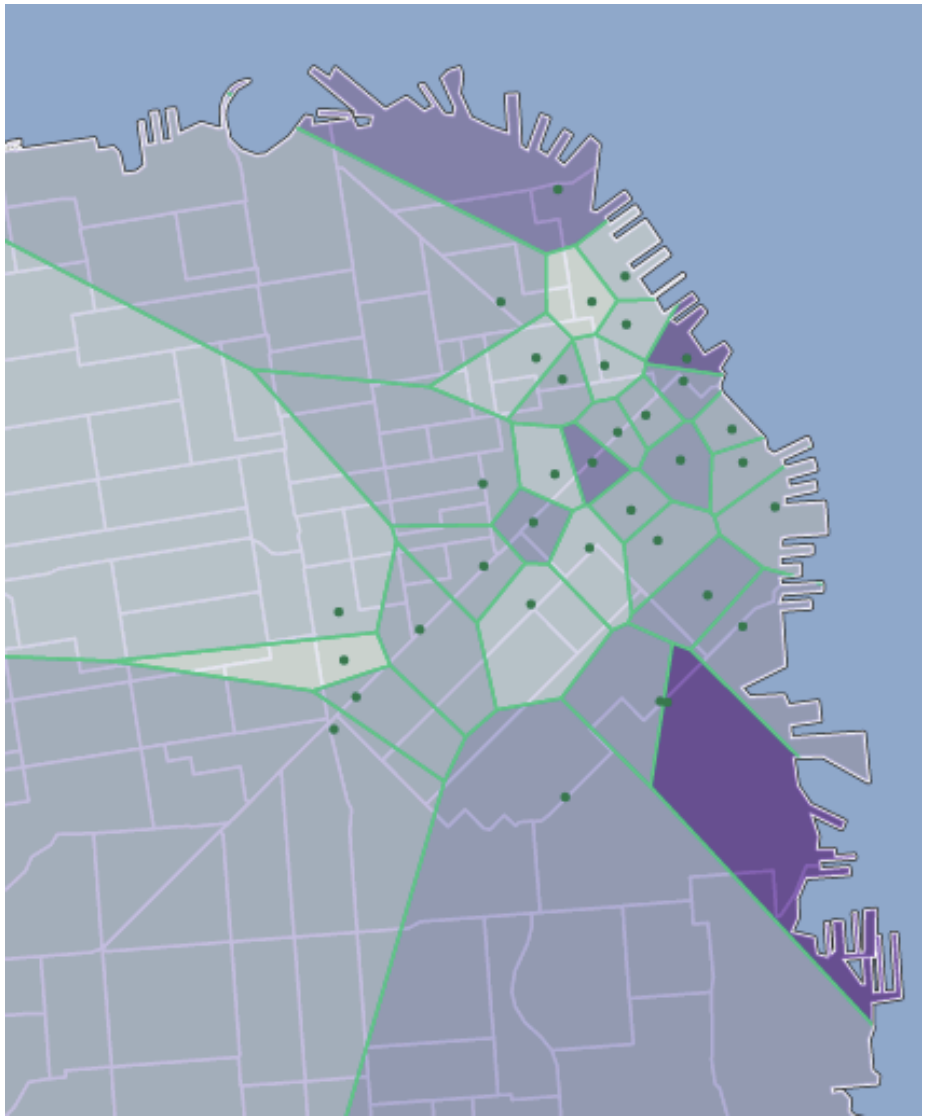
RELATED WORK

Interactive Map by Virot Ta Chiraphadhanakul

iOS App by Steve Gifford



Voronoi Diagram by David Belford & Jennifer Wong



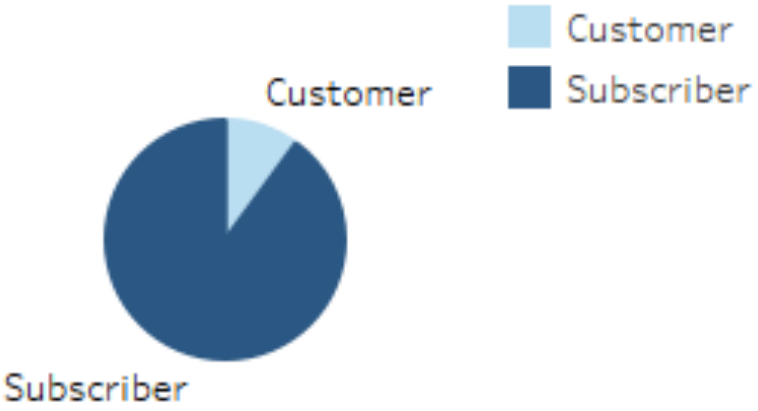
DATA

60% stations located in San Francisco
92% trips registered in San Francisco

We choose only San Francisco data from 2015.9 – 2016.8

80% rides made by annual subscribers

We mainly focus on subscribers



OUR GOAL

We have focused on answering the following questions:

- Most popular starting and ending stations?
- Weekly pattern for rides?
- Hourly pattern for rides?
- Weather condition impacts ridership or not?
- Which neighborhood has more rides by their subscribers?




DESIGN OVERVIEW

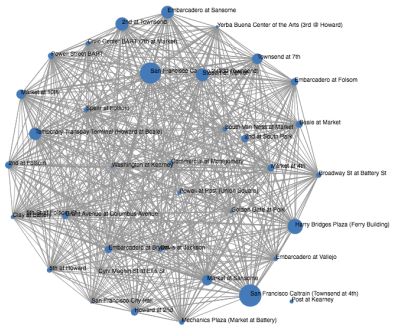
Geo Map combined with Bar Chart

Line Graph 

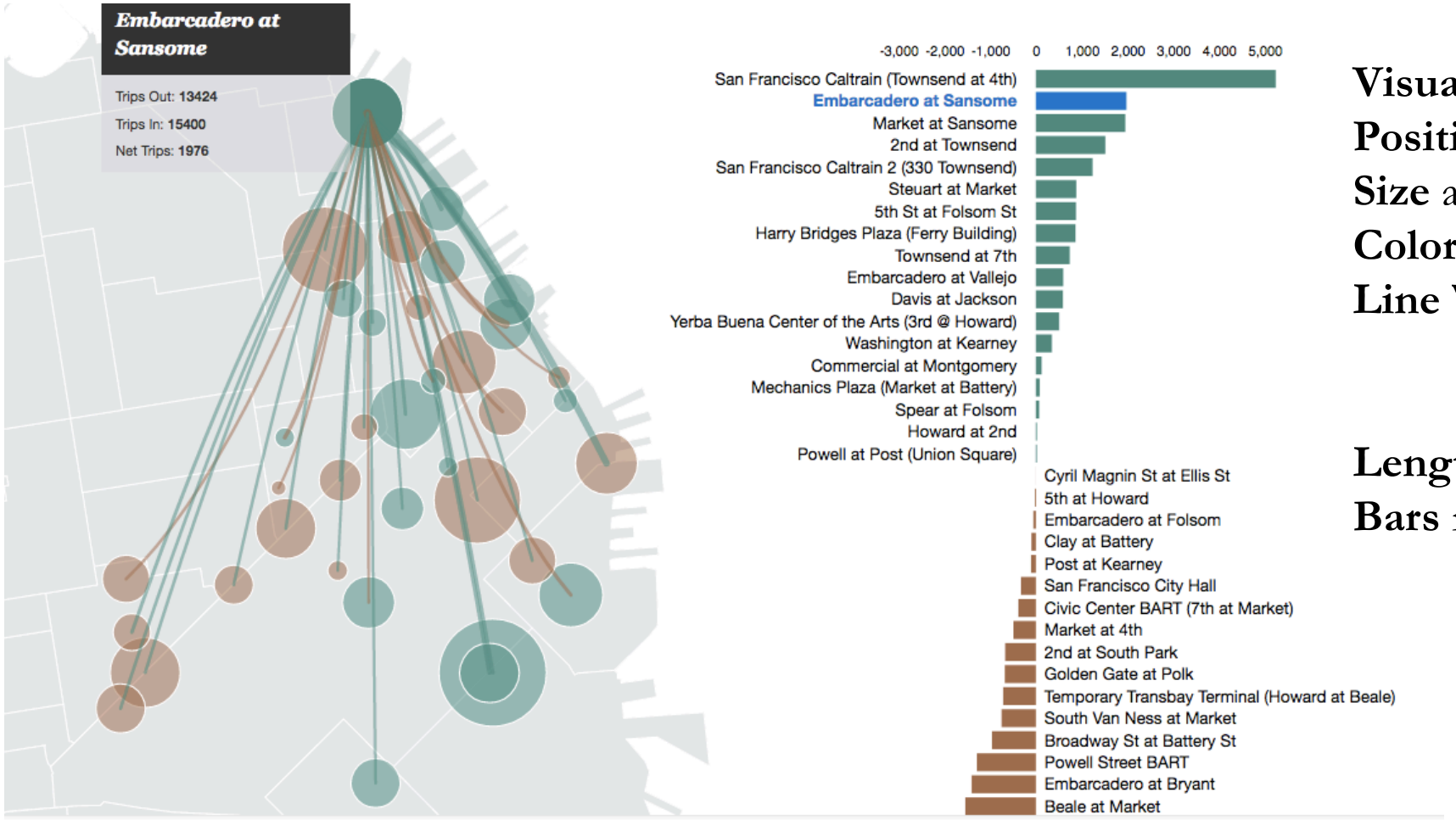
Circular Heat Map

Choropleth Map 

We also tried …



Most popular stations for incoming and outgoing



Visual Encodings

Positions geo position of stations

Size abs(coming trips – going trips)

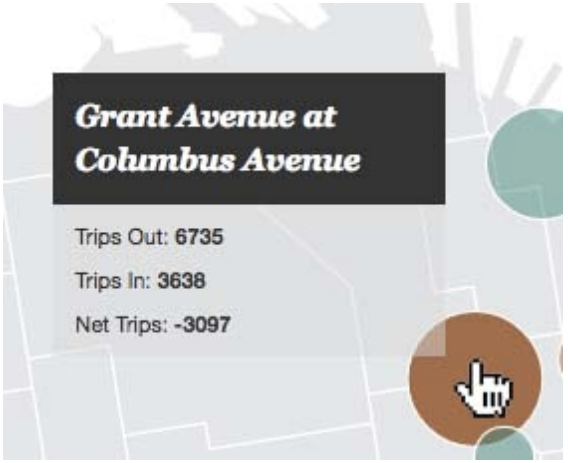
Color more coming | | more going

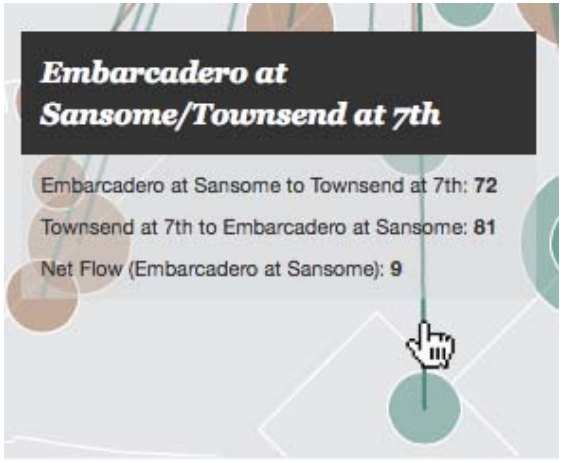
Line Weight abs(coming trips – going trips) for each

Length abs(coming trips – going trips)

Bars rankings

Interactions





Highlight, Coordinate
On mouse hover,
highlight both bar chart and geo map.

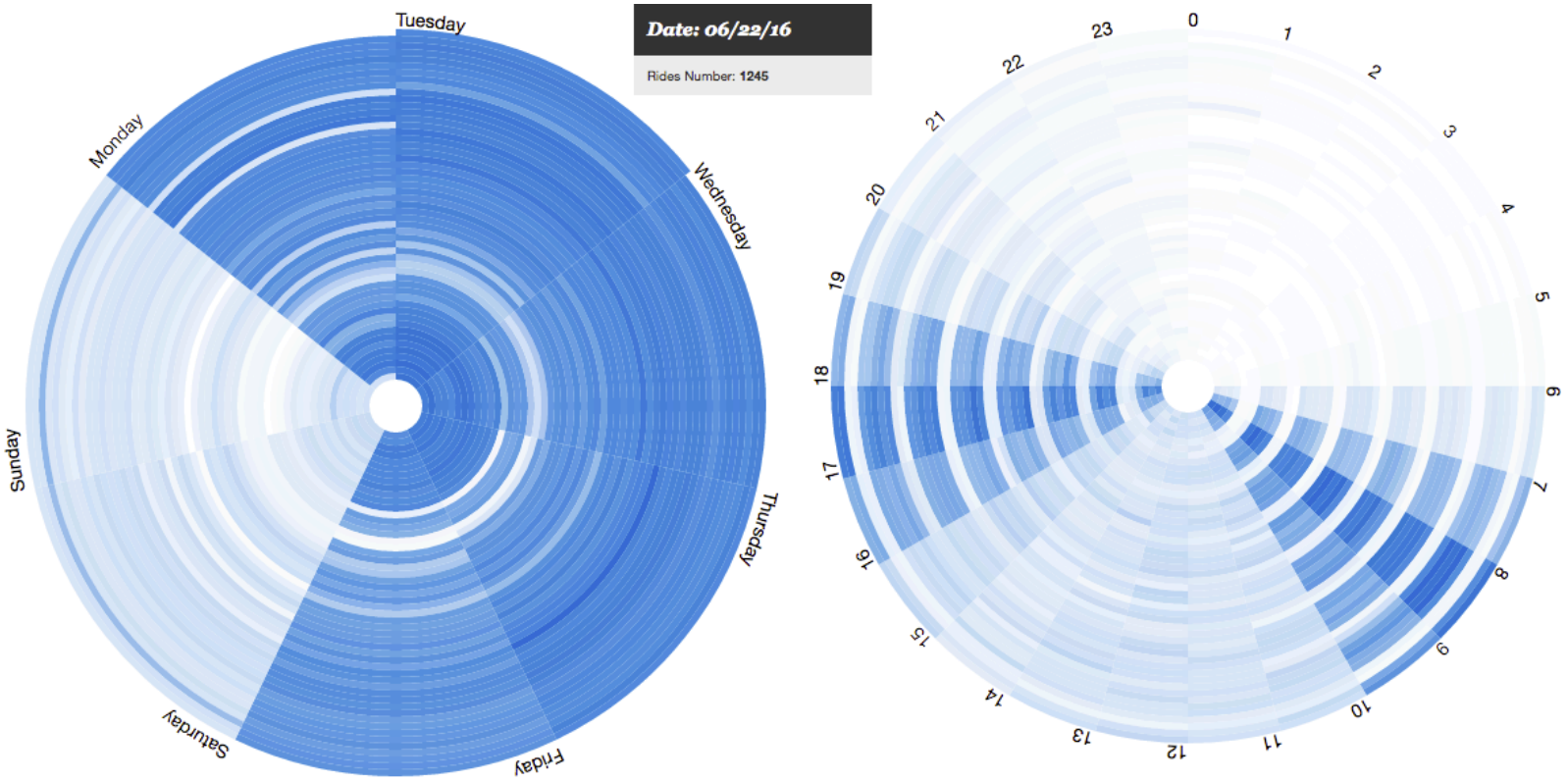
Select
Highlight
Coordinate
On mouse hover,
show details and highlight both bar chart and geo map.
On mouse click,
shows trips to and from that station.

Highlight
On mouse hover,
show details of this route.

Meet User Intent

Select, Explore,
Abstract/Elaborate,
Connect

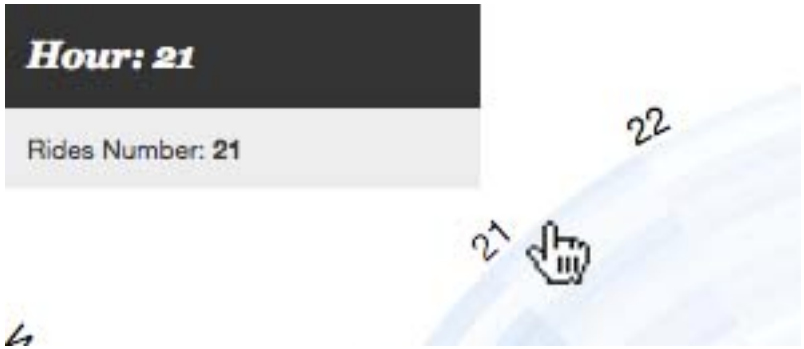
Weekly and hourly pattern of bike trips



Visual Encodings
Color number of trips

Time Series
Scope interval-based
Arrangement cyclic
Kind of Data states
Number of Variables univariate

Interactions



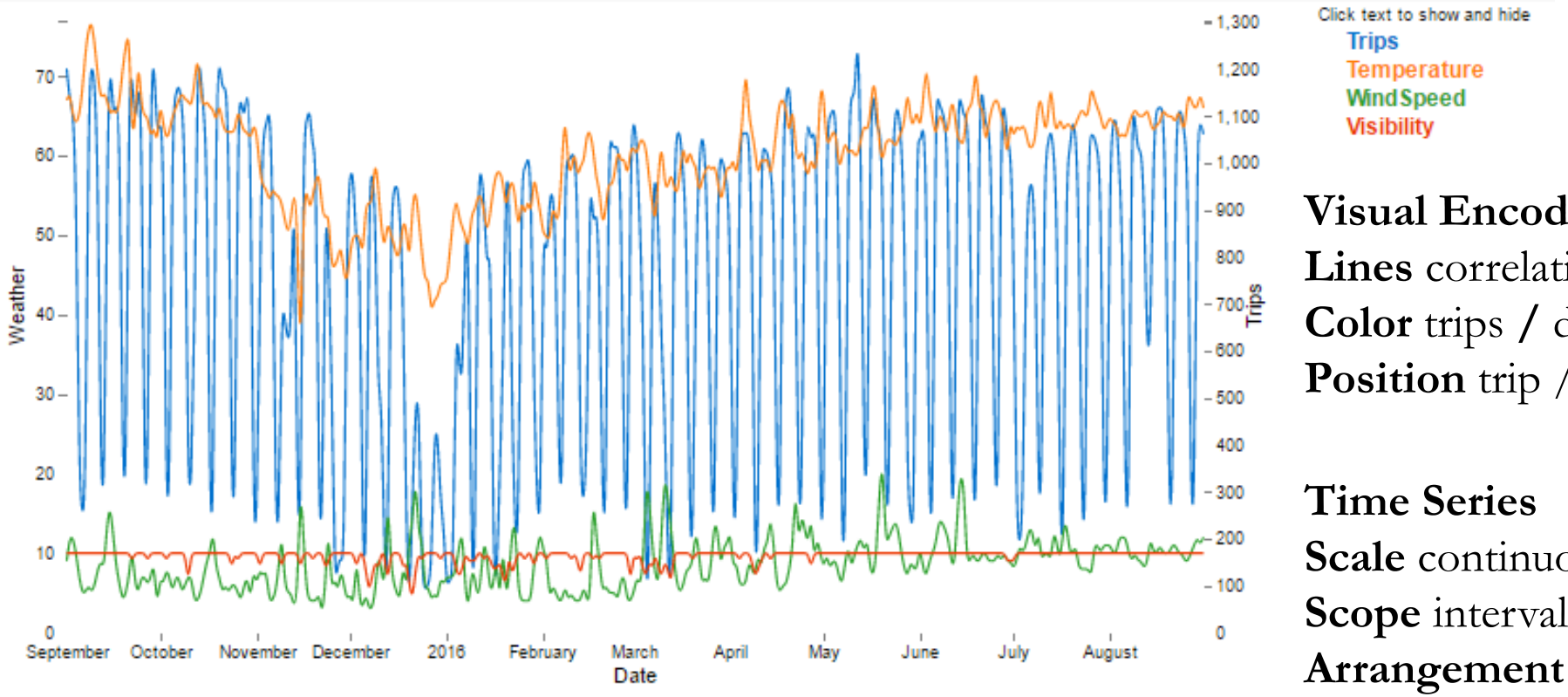
Highlight
On mouse hover,
show details of this day segment.

Highlight
On mouse hover,
show details of this hour segment.

Meet User Intent

Explore,
Abstract/Elaborate

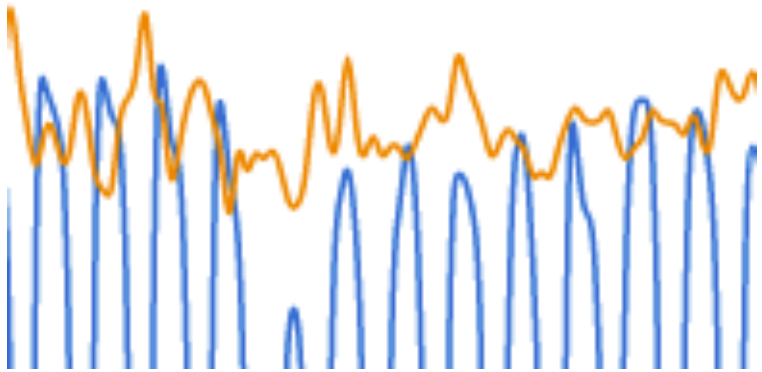
Weather condition impacts ridership



Visual Encodings
Lines correlation
Color trips / different weather indicators
Position trip / weather condition

Time Series
Scale continuous
Scope interval-based
Arrangement linear
Kind of Data states
Number of Variables multivariate

Interactions

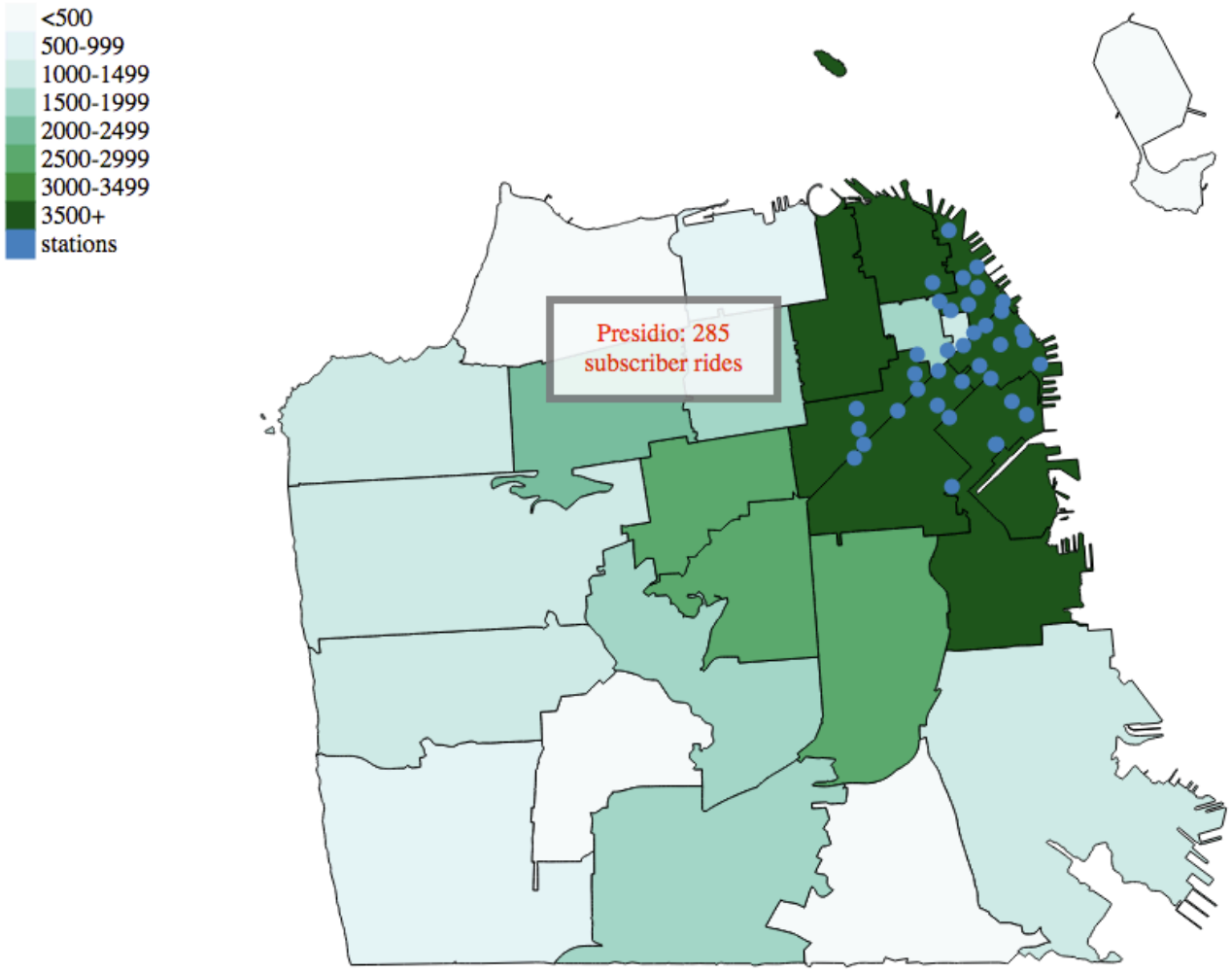


Filter, Select
On mouse click,
show or hide current line.

Meet User Intent

Select, Explore, Filter

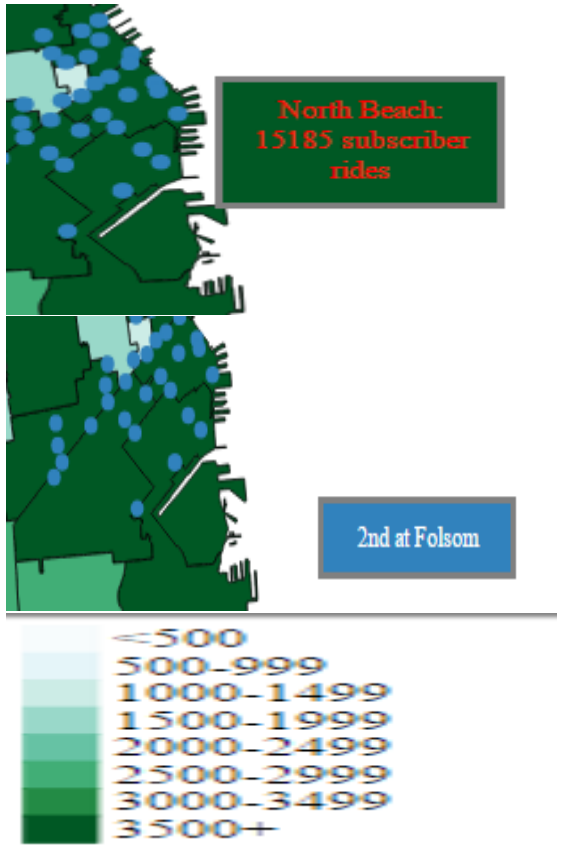
Which Neighborhood has more rides by their subscribers



Visual Encodings

Positions geo position of stations
Saturation number of subscriber rides

Interactions



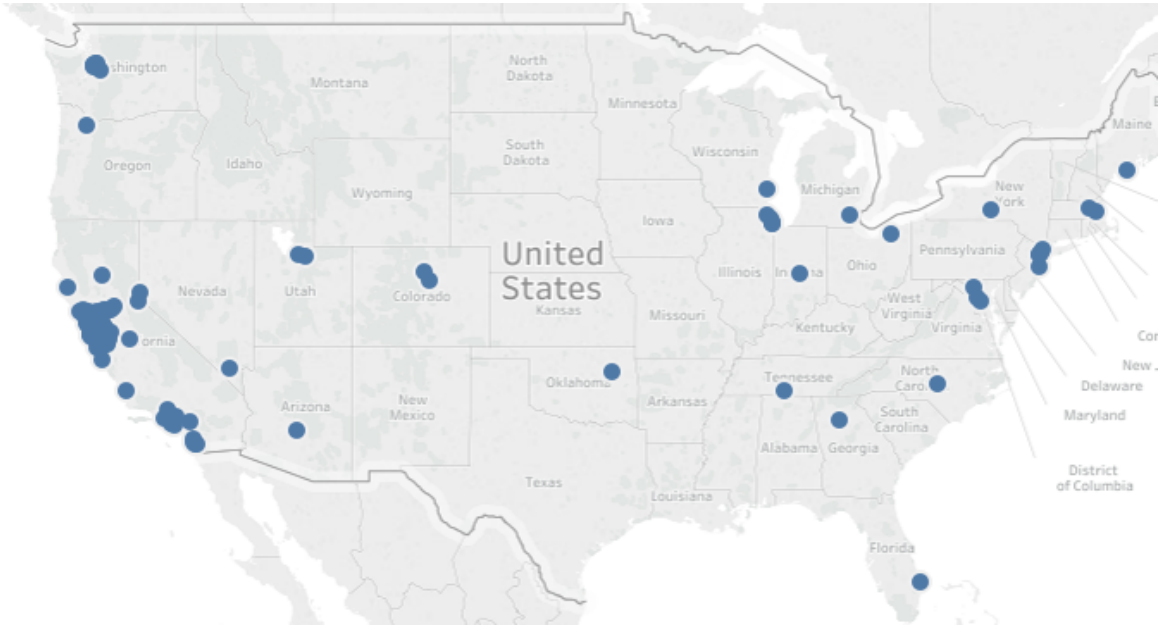
Highlight
Mouse hovering on a neighborhood shows the name and number of subscribers in that area.

Highlight
Mouse hovering on a station displays the name of that particular station.

Labels corresponding to the Hue.

Meet User Intent
Select, Explore, Abstract/Elaborate

CHALLENGES



- Zip codes of annual subscribers were not just from san Francisco but spread out across the US, for the purpose of our visualization, we only used zip codes limited to the San Francisco city limits.
- Since, Zip Code Tabulation Areas (ZCTAs) keep changing, finding an up to date GeoJSON file for San Francisco was a major challenge.

EVALUATION

12 Users, 8 Questions

Overall how effective is the system	Does the system convey the information that you are looking for?	Does the system inspire your thinking?	How do you rate the ease of interaction with the system?	Are the colors used in the system are friendly and easy to differentiate?	How do you rate the ease of navigation with in the system?	What do you like most about this visualization?	Suggestions
4.62	4.50	4.73	4.14	4.14	4.45		

Favorite Part of Our Visualization

Spiral Graph 3
Interaction 2
Use of Colors 2
Network Chart 1
Choropleth Map 1

Suggestions

Color selection of choropleth map can be improved.

Variations in the weather pattern are difficult to follow, it's better to plot the aggregate weekly data by avoiding weekends and also include rain event data.

IMPLEMENTATION

- HTML for holding the structure of pages.
- CSS for styling and maintaining the uniformity across pages.
- D3.js for drawing graphs.
- Tableau for preliminary visualizations and data analysis.
- R and Stata for data summary and analysis.

REFERENCE

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FUTURE WORK

One dimension not explored in this analysis was popularity of each station among subscribers vs customers. With what we saw of the behavior of customers vs subscribers we could identify stations more popular with tourists or with commuters and potentially identify areas of the city with demand for future stations.

Hope you liked our presentation.
Thank you!